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November 15, 2007

Subject: Public Comments regarding Supplement to Yucca Mountain Final EIS,
To be held November 27, 2007 at UNR- Lawler Event Center in Reno.

Dear Dr. Summerson,

Enclosed is a draft of the comments I should like to present at the scheduled meeting. You might remember me from one of your previous trips to Reno a year or so ago. I provided you a copy of a suggested public paper regarding the promotion of a Fast Breeder Closed Fuel Cycle Millennium Power capability for the US in Secure Underground Energy Parks/Centers. It has not yet been presented publicly, although many of my also retired nuclear engineering colleagues have reviewed and contributed to its contents. We share the national concern regarding world instabilities that are being exacerbated by ongoing energy related environmental economic and political impacts. We concur that the DOE initiated GNEP program is a good initial toe in the water program. It needs public disclosure, and increased public and industry support.

1 START

I suppose my planned statement is a little long, (about 20 min.) but I suspect it may be one of the few statements that endorse the repository and the excellent work you and your associates have accomplished. I'd appreciate your comments and please let me know soon it you can fit it into your agenda on the 27th.

Yours Truly, Joe Wetch

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YUCCA MOUNTAIN: 1st CYCLE SPENT NUCLEAR FUEL STORAGE REPOSITORY

Environmental Impact Statement Review, Reno, Nevada, November 27, 2007

By Joseph R. Wetch,

Retired; 50+yrs Nuclear Reactor, Energy Systems, High Level Nuclear Waste Sequestration Engineering-Management

Review of the subject EIS suggests that the DOE team at YUCCA MOUNTAIN has done a good job of addressing and formulating a design to implement the poorly formulated scope laid down by Congress nearly 20 years ago. Let us look 20-100 years, or even a millennia ahead!

NUCLEAR POWER - ANOTHER LOOK

Nuclear power is unique in its inherent ability to save our environment, ecology, domestic economy and to reduce international tensions. Nuclear power is the only proven source of power that can provide the enormous energy needs of modern industrial and urban society, while remaining totally isolated from the surface of the earth. It need not breathe air nor exhaust to it. It is not vulnerable to weather, tornadoes, clouds, or darkness of night. Its environmental footprint is concentrated and compact by hundreds fold compared to any hydrocarbon, hydro, wind, or solar energy source. It can be the most environmentally clean and healthful source of energy and it can uniquely be isolated underground for public security and it can be protected from hostile attacks in coming centuries.

The 77,000 tonnes of first cycle exposed "spent" fuel commonly known in Nevada as "Nuclear Garbage" can be reprocessed, re-fabricated and "re-burned" in fast breeder reactors multiple times to provide the USA 100% of its base load electric power for about 100 years. The 10 fold larger amount of "Depleted Uranium" from which the exposed fuel was derived could also be consumed to provide the USA its current total base load electric power needs for the entire millennia. (The US "Base load" is currently about 450,000 megawatts. "Peak load" and total installed electric generating capacity is about double the base load.) All this can be accomplished without any noxious or earth warming gas evolution. The world's un-mined uranium reserves utilized in the technically feasible closed breeder-actinide burner cycle can provide the developed world all of its base load power for several thousand years. The technology would be capable of utilizing the 3 fold more abundant Thorium resource to provide humanity all of its stationary environmentally clean electric power for some 10,000 years.

Major world powers: Britain, France, Russia, India, and China, have active nuclear fuel reprocessing capabilities. The US does not. Smaller countries such as South Africa, Israel, and possibly Pakistan have curtailed their programs under US pressure. The current unique and myopic US practice of a once thru nuclear fuel cycle uses only 0.2% to 0.4% of our uranium resource. Such unique waste limits our domestic nuclear reserves to some 40+ years and results in large imports of natural uranium yellow cake from Australia, Canada, and Africa. The absurd policy also produces large volumes of long-lived radioactive spent fuel to be surface stored and cooled in nearly 100 locales for about 30-50 years awaiting potentially hazardous long distance transport to a centralized repository across country. Some 85% of the fuel is in the eastern half of the USA. Nuclear power in the US currently produces about 20% of our base-load electricity and may produce a repository site overload in the single proposed spent fuel storage repository. Planned shipment to the single remote Nevada repository near Los Vegas has understandably y met with considerable public resistance.

SECURE UNDERGROUND REGIONAL NUCLEAR ENERGY CENTERS (SURNEC)--w/NUCLEAR FUEL RECYCLING

Modern US "Energy" and Mining industry seismology, geology, excavation, mining, tunneling, and ventilation, coupled with modern 21st century remote-controlled, robotic and automated operation and with state-of-art remote maintenance capabilities provide the technological opportunity for domestic US Industry, capital, labor and nuclear and chemical technologists to safely, economically and securely close the nuclear fuel cycle in a completely sequestered underground environment.

The US public should demand policy consideration be given now to facilitate immediate renewal of the education, research, development, design and licensing of 10 to 20 regional, fully contained, deep underground or mountain, nuclear energy centers. Each center may provide up to 10 to 20 thousand Megawatts of base load electric generation over the next 20 to 40 years. Each park would include modern Fast Breeder, Thorium Converter and Actinide Burner reactors with new compact, non-aqueous molten salt or gaseous fuel reprocessing. The *long-lived low level* radioactivity, and sufficient short lived (*gamma hot radioactivity)* will remain in the fuel to circumvent the possibility of Plutonium theft or proliferation. All fuel re-enrichment, re-fabrication, and reloading into the Fast Breeder-converters and Actinide reduction Fast Reactors can and should be done with state-of-the-art onsite shielded remote handling equipment.

Power generation facilities and the short-lived fission product separation, immobilization and isolation will all be incorporated onsite. Any obsolescent reactor at end of life, with its relatively short-lived activity, may simply be de-fueled, closed-off, and allowed to decay to normal background and be abandoned or recycled in-place in its private underground vault. Excess separated shorter-lived fission products may be immobilized and interned for decay to natural background within on-site repositories - *each with less than 1% the volume, heat and decay life currently planned for once exposed fuel "wastes" to be sent across the USA to YUCCA Mountain in Nevada.*

Some 14 to 17 Gen III "thermal neutron" water and gas cooled reactors are currently being considered for construction licensing, mostly at existing eastern reactor sites. It would be a step in the right direction to locate them as initial tenants within SURNEC sites.

ADVANTAGES OF "SECURE UNDERGROUND REGIONAL NUCLEAR ENERGY CENTERS" (SURNEC)

Fast neutron breeder reactors, thorium converters and compact fuel reprocessing and re fabrication are the enabling multipliers that provide for *Renewable Nuclear Energy Reserves*. SURNEC can effectively prevent the future diversion of fissionable material to weapons use. In current foreign and past US practice, in order to expedite easier and safer shipping and handling, fissionable weapons material is separated from radioactivity and decontaminated. This was done to facilitate off-site shipping *from centralized facilities to* dispersed reactors, fuel and weapons fabrication facilities and deployment to military organizations. POOR *IDEA FOR CURRENT AND FUTURE POLICY!*

In the proposed fully contained energy parks, *all facilities can and* will be *designed and built* to limit fissionable material enrichment to reduced levels suitable for reactor fuel only. That action, and retaining the long lived trans-uranic nuclides and gamma hot fission products in the fuel, will destroy the potential for diversion to weapons use. Reprocessing and re-fabrication of fuel and reinstallation into Fast neutron reactors for further burning can be accomplished with *high gamma active fission products and long half life actinides incorporated into the fuel.* The long-lived radioactive isotopes would shutdown current Thermal reactors, but can be incorporated into Fast reactors and converted to short-lived nuclides. This '*Fissium*' fuel has been demonstrated by Argonne National Laboratory personnel who successfully installed and operated it in the Experimental Breeder Reactor in Idaho. Work at Los Alamos, and at the Kurchatov Institute in Moscow, also confirm that much of the long-lived radionuclides can be converted to short lived nuclides in Fast reactors. These processes can all be automated and maintained using modern fully shielded, reliable, remotely operated and maintained equipment. The facilities can be designed built and maintained to handle highly radioactive fuel that is entirely unsuitable for theft or for off-site shipping and handling. (Extensive shielded shipping casks, major facility modification and a very large long term and sophisticated invasion and occupation force would be required to affect any theft.) The current public apprehensions concerning the establishment of geological repositories for sequestering spent fuel for multi millennia can be substantially alleviated. The late 1970s Administration prohibition of fuel reprocessing is out of date with modern technology and circumstances. The ten-plus proposed US subterranean energy centers would be monitored and defended far more effectively for the coming centuries than can be the existing *104 US and 433 Worldwide* nuclear power sites. *Sixty-nine additional Nuclear Thermal Burner Reactors are currently being planned or built around the world, (not in the US) —14min*

ARE WE THERE YET?? NO! We made some early tries, but we failed. We just weren't ready 50 years ago.

In response to President Eisenhower's call for an "Atoms for Peace" nuclear electric power development in the 1950s, much of the commercial and national laboratory nuclear industry turned its attention toward high yield advanced molten salt fueled and solid fueled liquid metal cooled fast reactors with high breeding ratios. Although some early tries were made, the technology and required engineering sophistication were not yet ready. The pressure and rush for commercial nuclear power by the late 50s and early 60s, and utility industry financial risk aversion, led to adapting the Navy's further developed reactor technology. Major specifications and suppliers were already proven and qualified in the Pressurized Water Reactor (PWR) Navy program. This shift drew technical talent and financial resources away from "advanced" reactor work. This, followed by Presidential decree in the late 70's to curtail US fuel reprocessing brought a near shut down of "advanced" reactor work in the USA. Finally, shutdown of the Fast Flux Test Facility (FFTF) at Hanford Washington in the mid 1990s ended fast reactor development in the USA. France, Russia, India and Japan continued developing first generation fast reactors and a few dedicated DOE researchers at Argonne, Idaho, and Los Alamos national laboratories have maintained some progress notably in "Pyro" reprocessing and in long lived Actinide isotope destruction reactor studies.

GLOBAL NUCLEAR ENERGY PARNERSHIP (GNEP)

The critical world shortage of energy, especially "clean" domestically available energy, has prompted the current US administration to initiate a revival of fuel reprocessing and closed fuel cycle fast reactor power generating system research. The Partnership includes the USA, France, Russia, India and Japan. Its current goals are to investigate and determine the best technologies and designs to recycle current spent fuel and to reduce and destroy long lived radioactive by products produced in power reactors. The effort is currently limited by the following:

a) There is a shortage in the USA of qualified young investigators and university professors with direct experience in past US and foreign work in the field.
b) The funding is very small relative to the efforts required and the support being invested in other areas of energy research and implementation subsidies.
c) Scope is again limited and does not explicitly include the essential fast BREEDER reactors.
d) The scope still considers only one or a few isolated reprocessing centers which will retain the requirement of long distance shipping of all spent fuel and the requirement for removal of radioactivity from reprocessed fuel to facilitate its shipment to "Burner" reactors located off site. Consequently, "proliferation" may still be plausible.
e) The shorter lived fission products will still have to be immobilized and shipped to a repository, unless the reprocessing is located at a repository site. Ex. Yucca Mountain.
f) The facilities are not explicitly relegated to under-ground "hardened" sites and therefore can be interdicted with current state of the art weaponry in any future international conflict over the next century.

US CONGRESS & "ENERGY" INDUSTRIES SHOULD INTRODUCE "SURNEC" OBJECTIVES AS POLICY GUIDANCE NOW

1) Initiate the survey, selection and licensing of multiple secure underground sites for implementation of a closed fuel cycle nuclear energy economy including any new Gen III "thermal burners", Gen IV "fast actinide burners" and Gen V "fast breeder" reactors to provide the capability for a completely contained renewable environmentally clean nuclear base load domestic energy economy. Such as the world's population explosion, environmental, impacts and resource availability will demand.
2) Nevada State and Federal Officials should support investigation of the YUCCA mountain "repository" as a pilot demonstration of a Secure Underground Regional Nuclear Energy Center with no more than 10% of the nation's spent fuel destined to be deposited there for future conversion and recycle.
3) The domestic "Energy" industry know-how and resources should be encouraged to expand their 20th century world energy development leadership to the new technologies and opportunities of the 21st and 22nd centuries now, in order to ensure Democracy's future within world affairs.

~18–20 min

APPENDIX

NOTES AND DEFINITIONS:

1) *Base Load*: refers to the relatively continuous load factor draw upon a utility. It may vary from less than 50% to greater than 90%, and if it exceeds 100%, the utility must draw from its neighbors or reduce customer service i.e. "Brown Out"
2) *Plant Factor*: refers to the fraction of rated power output times the fraction of time the plant is available to produce full power.
   a) The current nuclear industry is operating at nearly 94% plant factor.
   b) Coal plants generally average of the order of 75-85+% plant factor.
   c) Wind power farms generally operate at plant factors in the range of 17% upwards to about 30% of rated power times time of operation. (Power output varies as wind velocity cubed.)
   d) Solar power is typically limited to of the order of 50% of full power rating times the time the Sun shines brightly, of the order of 4 to 10 hours per day if the clouds permit.
   e) Natural gas turbine plants are relatively lower capital cost but high in fuel cost. They generally are best operated at load factors less than 50%. As such they are best suited to operate when the sun does not shine and when the wind does not blow. Natural gas is essential to the fertilizer and plastics industries and the US has only 4% of the world reserves and consumes over 20% of world production.
3) *Energy storage*: Nuclear and coal plants operate night or day in all weather. Wind farms generate power at the whim of the wind which can fluctuate during the day, day to day and week to week. Extensive application must be backed up with a large grid containing nuclear or fossil fueled power plants, with back up Natural gas units or with energy storage.

Note: One day of energy storage of a wind or solar farm of 1000 megawatt output, that is equivalent to 1 typical nuclear or coal fired steam turbine, would require a hydro dam with a 100 foot water fall thru the water turbine and a lake below the dam a (water source) about 100 ft deep by 1000 ft wide by over 20 miles long to be pumped up to a much larger lake above the dam. The cheapest batteries for energy storage may still be lead-acid. Such batteries can provide good life when charged and discharged no more than about 10 watt-hours per pound. So, at 50 cents/pound of battery, about 1000 megawatts could be stored for one day at an investment cost of about $1.2 billion. A reasonable conclusion suggests that the part time availability of wind and solar power may limit their usefulness until the country develops a very large inventory of plug-in electric cars and a wide spread electric plug in infrastructure in the nation's homes, garages, parking lots and street-side parking meters.]

END

Fax Cover Sheet

November 15, 2007

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